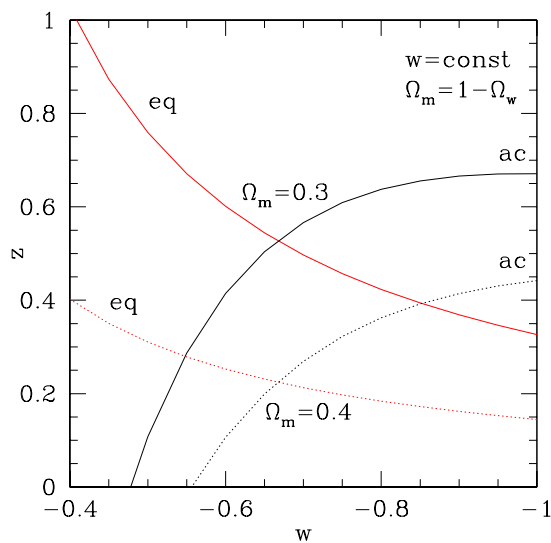# Redshift Range Strategy for SNAP

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What drives the redshift for determining dark energy?

- Physics of Density Evolution

- Physics of Expansion Acceleration

- Breaking Degeneracy, e.g. Ω_m, Ω_w combination

- Discriminating between Dark Energy Models

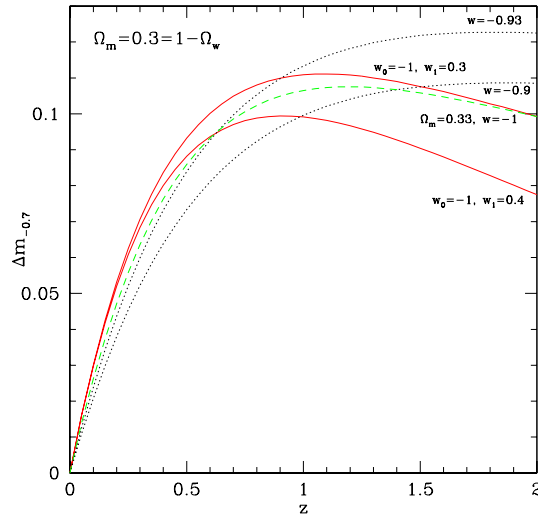Discrimination between models is much tougher and more important.

Supernovae and other methods today limit

$$w < -0.6 \quad (95\% \text{ c.l.})$$

What would a measurement $w = -0.8 \pm 0.1$ (1σ) tell us?

- Nothing new.

- Confuses $w_{\mathrm{meas}} = -0.8$ with $w = -1$.

- Confuses $w_{\mathrm{meas}} = -1.2$ with $w = -1$.

Discrimination requires $z > z_{\mathrm{eq}},\ z_{\mathrm{ac}}$.

Need to see time variation in w

$\quad\Rightarrow$ definitive difference from cosmological constant.

- $w(z) = w_0 + w_1 z$ vs. $\langle w \rangle$ vs. tomography

- $w \neq -1$ not necessarily true.
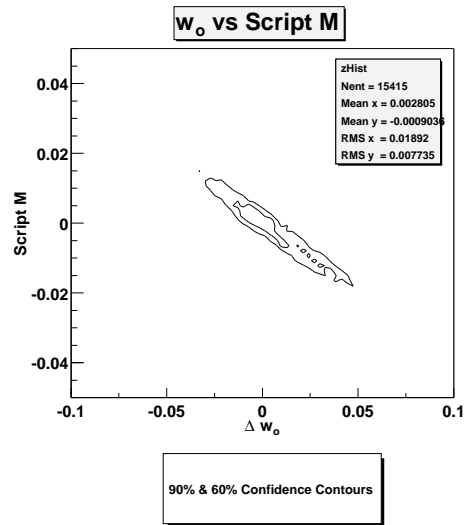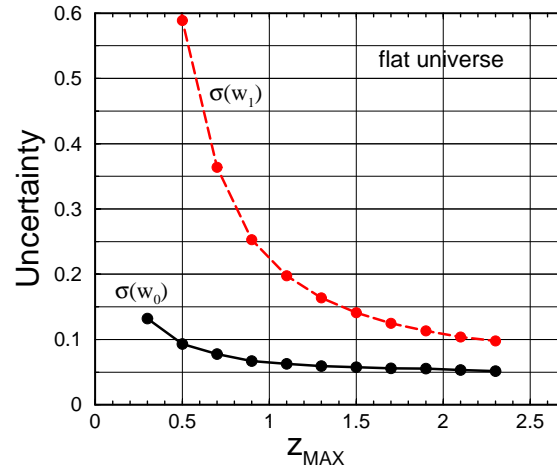
- Not able to see spatial variation in dark energy.

Confusion plot indicates

- Need complementary info: Ω_m, Ω_T, $\mathcal{M}$

- Need higher redshift:

$$\delta w_0 < 0.1 \quad ; \quad \delta w_1 < 0.2 \quad ; \quad \delta m < 0.02 \qquad \Rightarrow z > 1.5$$

Best way to visualize survey depth results?

- Table of δw vs. z_{max}?

- Plot of δw vs. z_{max}?

- Contours of $\delta w - \Omega_m$ or $\delta w_0 - \delta w_1$ shaded by z_{max}?

Systematic Errors:

- Grey dust

- Weak lensing

- Supernova physics

- Complementary methods' systematics

Current survey depth results are separate for statistical errors and systematic errors (very rough).

- Current systematic $\delta m \sim z$

- Looking over 70% age of universe

- Need realistic model

Need to incorporate statistical and systematic errors together for rigorous assessment of survey redshift range.